RF TEST REPORT

Report No.:	SET2020-07650
Product Name:	LTE OBD dongle
FCC ID:	PJ7-N2110-AM
Model No. :	N2110-AM
Applicant:	Shenzhen Neoway Technology Co., Ltd.
Address:	4F-2#, Lianjian Science&Industry Park, Huarong Road, Dalang, Longhua District, Shenzhen City, Guangdong Province, P.R.China.
Dates of Testing:	07/10/2020 —07/13/2020
Issued by:	CCIC Southern Testing Co., Ltd.
Lab Location:	Electronic Testing Building, No. 43 Shahe Road Xili Street, Nanshan District Shenzhen, Guangdong 518055, China. Tel：86 755 26627338 Fax：86 755 26627238

Test Report

Product……:	LTE OBD dongle
Brand Name……:	neoway
Trade Name……:	neoway
Applicant……:	Shenzhen Neoway Technology Co., Ltd.
Applicant Address……:	4F-2#, Lianjian Science&Industry Park, Huarong Road, Dalang, Longhua District, Shenzhen City, Guangdong Province, P.R.China.
Manufacturer……:	Shenzhen Neoway Technology Co., Ltd.
Manufacturer Address….:	4F-2#, Lianjian Science&Industry Park, Huarong Road, Dalang, Longhua District, Shenzhen City, Guangdong Province, P.R.China.
Test Standards……:	47 CFR FCC Part 2/22/24
Test Result……:	PASS

Tested by……: Vincent 2020.07.13

Vincent，Test Engineer

Reviewed by……: Chris You 2020.07.13

Chris You, Senior Engineer

Approved by……: Shuangwen Zhang 2020.07.13

Shuangwen Zhang，Manager

Table of Contents

Change History		
Issue	Date	Reason for change
1.0	2020.07.13	First edition

1. GENERAL INFORMATION

1.1 EUT Description

EUT Type	LTE OBD dongle
EUT supports Radios application	GSM/GPRS/EDGE
Multi Slot Class	GPRS: Multi slot Class12, EGPRS: Multi slot Class12
Test Band Frequency Range	GSM 850MHz: Tx: 824.2 - 848.8MHz (at intervals of 200kHz); Rx: 869.2 - 893.8MHz (at intervals of 200kHz) GSM 1900MHz: Tx: 1850.2 - 1909.8MHz (at intervals of 200kHz); Rx: 1930.2 - 1989.8MHz (at intervals of 200kHz)
Type of Modulation	GSM / GPRS:GMSK/8PSK
Antenna Type	Internal Antenna

1.2 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

System	Type of Modulation	Maximum ERP/EIRP(W)
GSM 850	GMSK	1.560
GSM 1900	GMSK	0.783
EDGE 850	8PSK	0.401
EDGE 1900	8PSK	0.220

1.3 Test Standards and Results

1. 47 CFR Part 2, 22(H), 24(E), 27(L)

2. ANSI C63.26:2015

3. FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01

Test Result ： The test data except radiated spurious emissions and ERP/EIRP of this report refers to FCC ID:PJ7-N27-W3

1.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.
Following shows an offset computation example with cable loss 6B and 10dB attenuator.

Example:

Offset (dB) = RF cable loss(dB) + attenuator factor(dB).
= 7.5+ 10 = 17.5(dB)

1.5 Facilities and Accreditations

1.5.1 Test Facilities

NVLAP Lab Code: 201008-0

CCIC-SET is a third party testing organization accredited by NVLAP according to ISO/IEC 17025. The accreditation certificate number is 201008-0.

FCC- Designation Number: CN5031

CCIC-SET. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN5031, valid time is until December 31, 2020.

ISED Registration: 11185A

CAB identifier: CN0064

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on Aug. 04, 2016, valid time is until Dec. 31, 2020

1.5.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15℃- 35℃
Relative Humidity (%):	30% -60%
Atmospheric Pressure (kPa):	86KPa-106KPa

2. 47 CFR PART 2, PART 22H & 24E REQUIREMENTS

2.1 Transmitter Radiated Power (EIRP/ERP)

2.1.1 Requirement

The substitution method, in ANSI C63.26:2015, was used for ERP/EIRP measurement, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v03r01. The ERP of mobile transmitters must not exceed 7 Watts (Cellular Band) and the EIRP of mobile transmitters are limited to 2 Watts (PCS Band) and 1 Watts (AWS Band).

2.1.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.1.3 Test Procedures

1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.2.1. (for CDMA/WCDMA), Section 5.2.2.2 (for GSM/GSM/GPRS) and ANSI / TIA-603-D-2010 Section 2.2.17.
2. The EUT was placed on a turntable 1.5 meters high in a fully anechoic chamber.
3. The EUT was placed 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. GSM operating modes: Set RBW= 1MHz, VBW= 3MHz, RMS detector over burst;

   UMTS operating modes: Set RBW= 100 kHz, VBW= 300 kHz, RMS detector over frame, and use channel power option with bandwidth=5MHz, per KDB 971168 D01 v03r01.
5. The table was rotated 360 degrees to determine the position of the highest radiated power.
6. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
7. Taking the record of maximum ERP/EIRP.

8. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.

9. The conducted power at the terminal of the dipole antenna is measured.

10. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.

11. ERP/EIRP = Ps + Et – Es + Gs = Ps + Rt – Rs + Gs

Ps (dBm)：Input power to substitution antenna.

Gs (dBi or dBd)：Substitution antenna Gain.

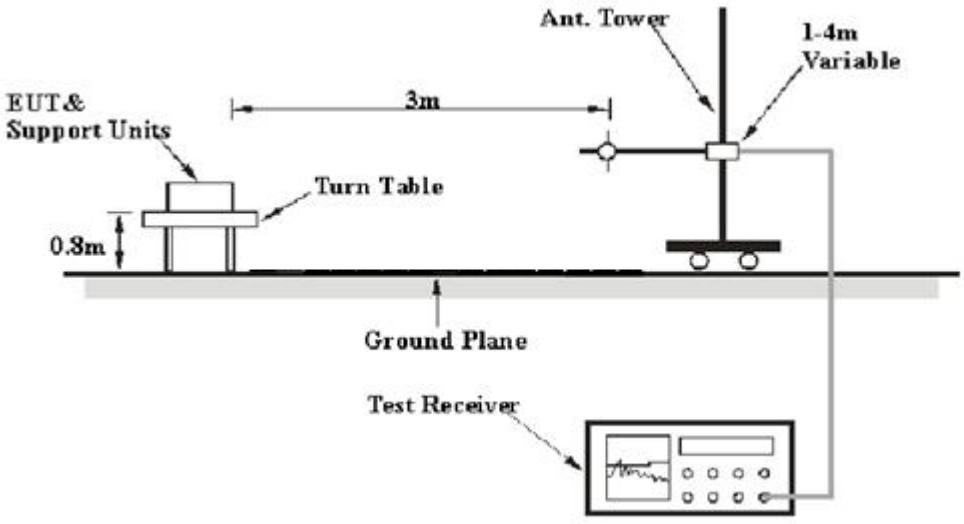
Et = Rt + AF Es = Rs + AF

AF (dB/m)：Receive antenna factor

Rt：The highest received signal in spectrum analyzer for EUT.

Rs：The highest received signal in spectrum analyzer for substitution antenna.

2.1.4 Test Setup



2.1.5 Test Result of Transmitter Radiated Power

Band	Channel	Frequency (MHz)	PCL	Antenna Pol (H/V)	Measured ERP dBm	Limit dBm	Verdict
GSM 850MHz	128	824.20	5	H	30.52	38.5	PASS
				V	31.45		
	190	836.60	5	H	30.84		PASS
				V	**31.93**		
	251	848.80	5	H	31.12		PASS
				V	31.53		

Band	Channel	Frequency (MHz)	PCL	Antenna Pol (H/V)	Measured EIRP dBm	Limit dBm	Verdict
GSM 1900MHz	512	1850.2	0	H	28.63	33	PASS
				V	28.44		
	661	1880.0	0	H	**28.94**		PASS
				V	28.39		
	810	1909.8	0	H	28.48		PASS
				V	28.27		

Band	Channel	Frequency (MHz)	PCL	Antenna Pol (H/V)	Measured ERP dBm	Limit dBm	Verdict
EDGE 850MHz	128	824.20	5	H	**26.03**	38.5	PASS
				V	24.17		
	190	836.60	5	H	26.00		PASS
				V	23.89		
	251	848.80	5	H	26.01		PASS
				V	23.87		

Band	Channel	Frequency (MHz)	PCL	Antenna Pol (H/V)	Measured EIRP dBm	Limit dBm	Verdict
EDGE 1900MHz	512	1850.2	0	H	23.26	33	PASS
				V	21.43		
	661	1880.0	0	H	23.12		PASS
				V	21.46		
	810	1909.8	0	H	**23.43**		PASS
				V	21.16		

2.2 Radiated Spurious Emissions

2.2.1 Requirement

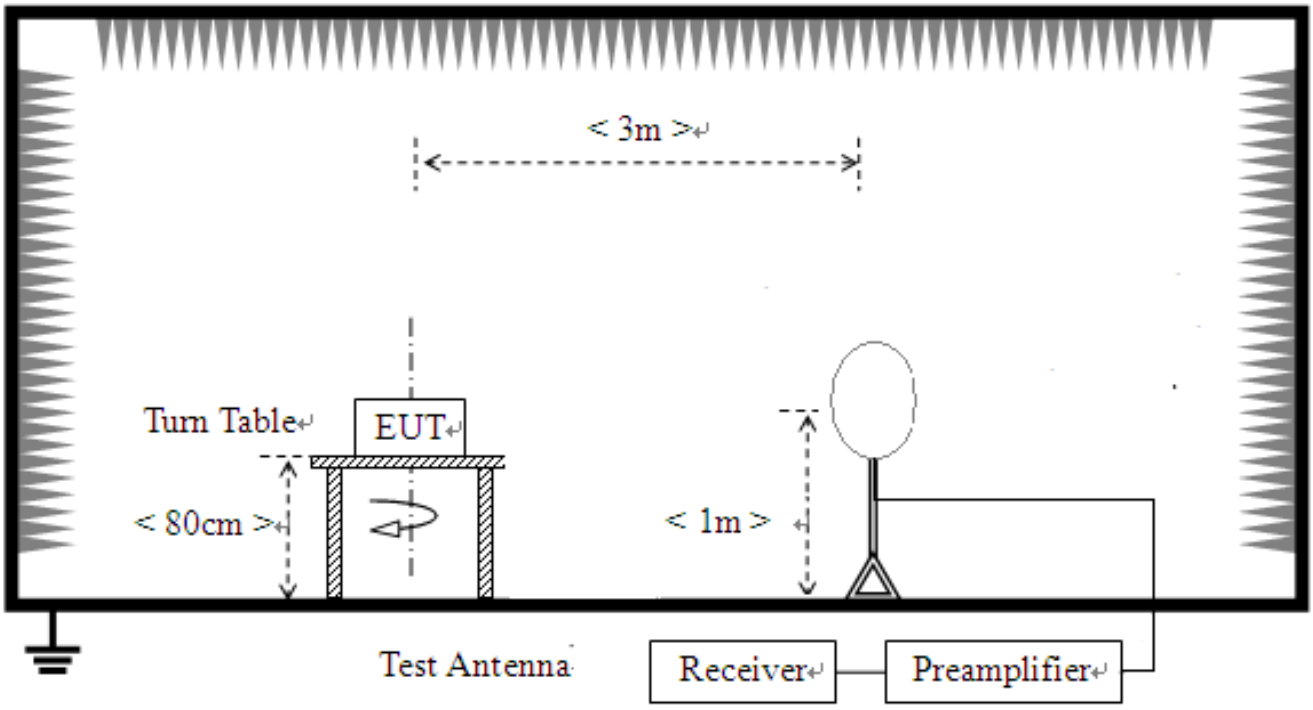
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

2.2.2 Measuring Instruments

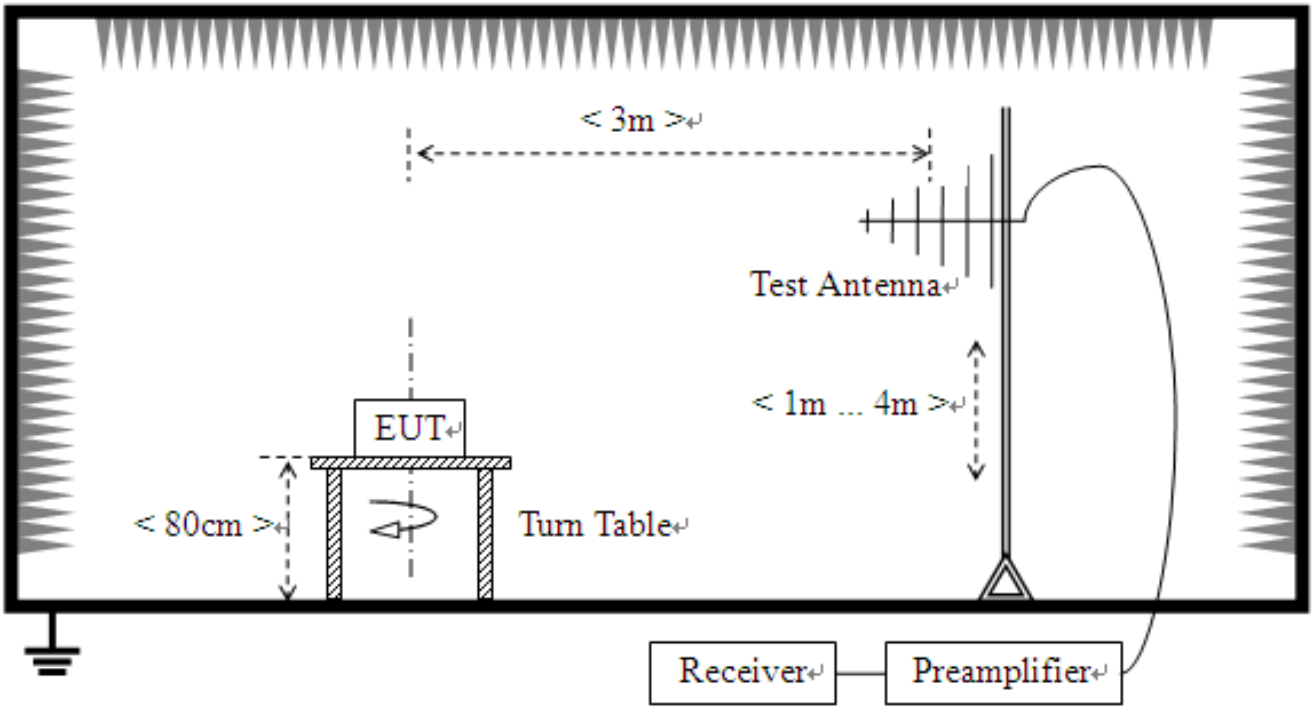
The measuring equipment is listed in the section 3 of this test report.

2.2.3 Test Setup

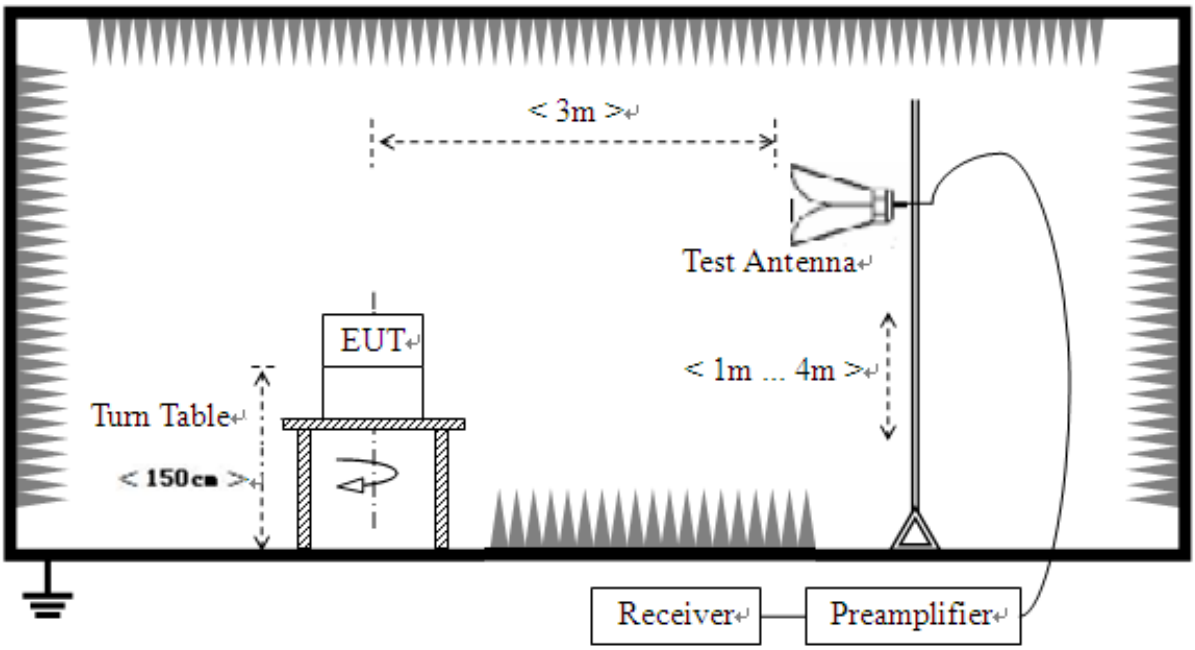
For radiated emissions from 9 kHz to 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



2.2.4 Test Procedures

1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.8.
2. The EUT was placed on a rotatable wooden table 0.8/1.5 meters above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
12. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)
    = P(W) - [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.
13. This device employs GMSK technology with GSM and GSM capabilities. All configurations were investigated and the worst case emissions were found in GSM mode.
14. This device employs UMTS technology with WCDMA (AMR/RMC), HSDPA, HSUPA capabilities. All configurations were investigated and the worst case UMTS emissions were found in RMC WCDMA mode at 12.2Kbps.
15. This unit was tested with its standard battery.
16. All Spurious Emission tests were performed in X, Y, Z axis direction and low, middle, high channel. And only the worst axis test condition was recorded in this test report.
17. The spectrum is measured from 9 KHz to the 10^{th} harmonic of the fundamental frequency

of the transmitter using CISPR quasi peak detector below 1GHz. The worst case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.

18. For 9KHz to 30MHz: the amplitude of spurious emissions are attenuated by more than 20dB below the permissible value has no need to be reported.

2.2.5 Test Results of Radiated Spurious Emissions

Note: 1. (Absolute)Level=Reading Level + Factor

Worst-Case test data provide as below:

GSM850 Middle Channel

30MHz~10GHz:

NO.	Freq. [MHz]	Reading Level [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	234.091	-88.44	-67.44	-13.00	54.44	21.00	Horizontal
2	353.117	-92.77	-65.42	-13.00	52.42	27.35	Horizontal
3	1304.15	-51.88	-55.08	-13.00	42.08	-3.20	Horizontal
4	3233.11	-53.81	-46.10	-13.00	33.10	7.71	Horizontal
5	4013.50	-54.44	-45.47	-13.00	32.47	8.97	Horizontal
6	6586.79	-54.45	-40.06	-13.00	27.06	14.39	Horizontal

NO.	Freq. [MHz]	Reading Level [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	95.6586	-92.28	-69.06	-13.00	56.06	23.22	Vertical
2	229.239	-87.98	-66.55	-13.00	53.55	21.43	Vertical
3	1292.14	-52.51	-55.58	-13.00	42.58	-3.07	Vertical
4	2324.66	-53.66	-49.92	-13.00	36.92	3.74	Vertical
5	3205.10	-54.87	-46.62	-13.00	33.62	8.25	Vertical
6	6610.80	-54.29	-40.46	-13.00	27.46	13.83	Vertical

Worst-Case test data provide as below:

GSM1900 Middle Channel

30MHz~20GHz:

Suspected List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	36.7934	-89.94	-68.29	-13.00	55.29	21.65	Horizontal
2	59.1146	-83.99	-65.57	-13.00	52.57	18.42	Horizontal
3	2685.89	-56.01	-47.76	-13.00	34.76	8.25	Horizontal
4	5161.08	-58.69	-46.83	-13.00	33.83	11.86	Horizontal
5	7164.58	-58.67	-41.84	-13.00	28.84	16.83	Horizontal
6	10646.3	-62.68	-38.44	-13.00	25.44	24.24	Horizontal
Suspected List							
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Polarity
1	36.7934	-90.76	-70.87	-13.00	57.87	19.89	Vertical
2	61.0555	-84.81	-65.56	-13.00	52.56	19.25	Vertical
3	89.6848	-99.23	-76.84	-13.00	63.84	22.39	Vertical
4	2705.23	-56.60	-47.58	-13.00	34.58	9.02	Vertical
5	5086.04	-58.34	-44.19	-13.00	31.19	14.15	Vertical
6	10698.8	-62.65	-38.80	-13.00	25.80	23.85	Vertical

3. LIST OF MEASURING EQUIPMENT

Description	Manufacturer	Model	Serial No.	Cal. Date	Due Date	Remark
EMI Test Receiver	R&S	ESU8	A0805559	2020.04.03	2021.04.02	Radiation
Loop Antenna	Schwarz beck	HFH2-Z2	100047	2019.04.26	2022.04.25	Radiation
Broadband antenna (30MHz~1GHz)	Schwarbeck	BBHA 9120 J	A190503537	2019.01.07	2021.01.06	Radiation
Broadband antenna (30MHz~1GHz)	R&S	HK116	A130701424	2018.01.19	2021.01.18	Radiation
Double ridge horn antenna (1GHz~18GHz)	R&S	HF906	100150	2019.04.27	2022.04.26	Radiation
Double ridge horn antenna (1GHz~18GHz)	R&S	HF906	100149	2019.04.17	2022.04.16	Radiation
Horn antenna (18GHz~26.5GHz)	AR	AT4002A	305753	2017.11.10	2020.11.09	Radiation
Horn antenna (18GHz~26.5GHz)	AR	AT4003A	0329293	2018.09.17	2020.09.16	Radiation
Amplifier 1GHz-18GHz	AR	25S1G4AM1	22018	2018.09.17	2020.09.16	Radiation
Ampilier 20M~3GHz	MILMEGA	80RF1000-250	1064573	2017.10.09	2020.10.08	Radiation
Spectrum Analyzer	KEYSIGHT	N9030A	A160702554	2020.05.18	2021.05.17	Conducted
Test Receiver	R&S	ESIB26	A0304218	2020.04.29	2021.04.28	Conducted
Temperature chamber	Tomilo	TOD-B165FXS-4K	A181003256	2019.11.21	2020.11.20	Conducted
Wideband Radio Communication tester	R&S	CMW500	A130101034	2019.07.30	2021.07.29	Conducted
Power Supply	R&S	NGMO1	101037	2019.08.03	2020.08.02	Conducted

4. UNCERTAINTY OF EVALUATION

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence . The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Emission Measurement (150KHz~30MHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	2.6dB

Uncertainty of Radiated Emission Measurement (30MHz~1GHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	2.4dB

Uncertainty of Radiated Emission Measurement (1GHz~40GHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	2.8dB

** END OF REPORT **